



2016 Conference on Systems Engineering Research

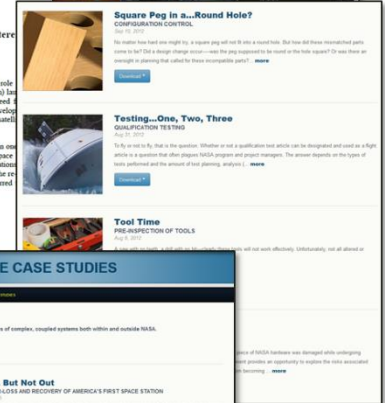
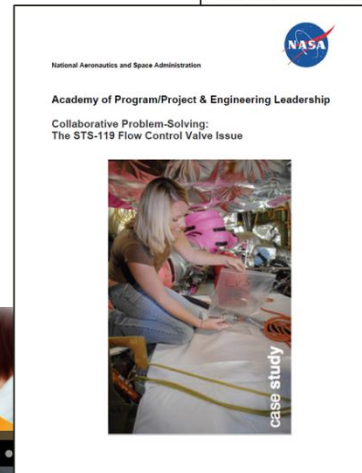
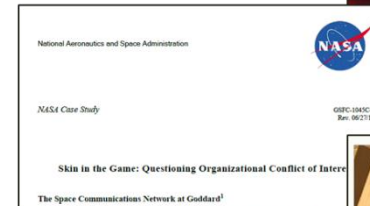
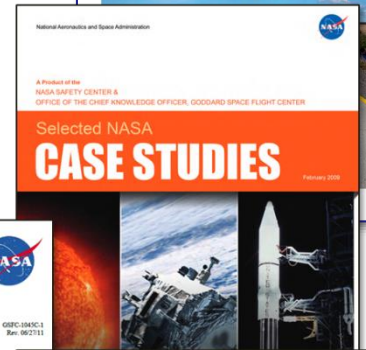
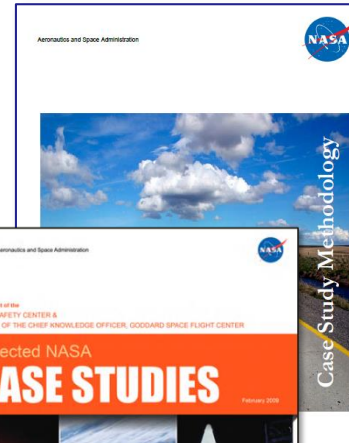
Enhancing systems engineering education through case study writing

**Jennifer Stenger Stevens
NASA/ Marshall Space Flight Center
March 24, 2016**



Agenda

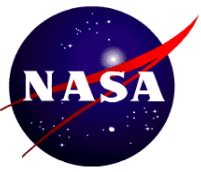
- Case Study Writers Workshop
- SE educational need
- Improvement with Subject Area Knowledge
- Future Research



**Make a Case
for Marshall Success**

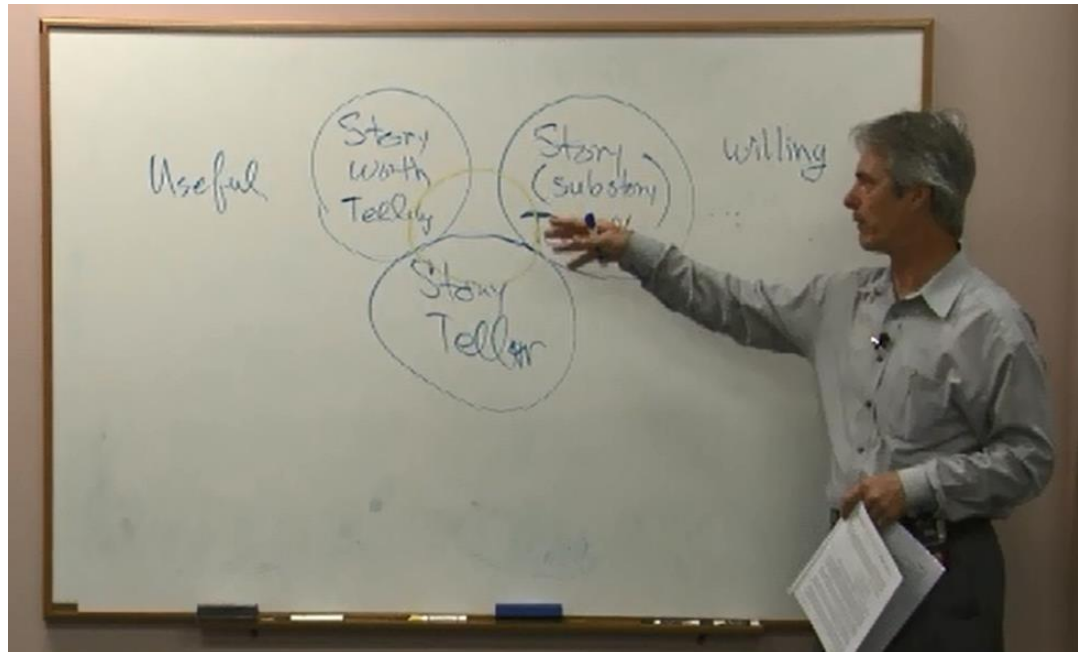
Write a NASA Case Study

Sign up in SATERN for April 6-7 Case Study Workshop. Learn more...



Why Case Study Writing?

- Wide variety of styles for a plethora of purposes
 - Advertising ←————→ Academic Research
 - Focus on teaching, instructional case studies, and decisional (~3-10 pages)

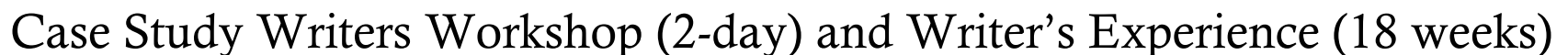


Learning from case studies “stretches your mind for 30 minutes.
It won’t go back exactly to the shape it was before”

Ed Rogers, GSFC Chief Knowledge Officer



-
- A woman with short dark hair, wearing a green jacket, is seated at a desk and speaking. She is gesturing with her hands while looking towards a computer monitor. The monitor displays a blue screen with some text. In the foreground, the back of a person's head with blonde hair is visible, looking towards the speaker. On the desk, there is a red folder, a white cup, and some papers. Another person is visible in the background, also at a computer workstation.





SE skills

Case Study Writing

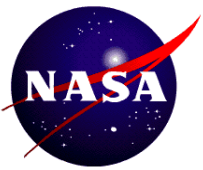
Case Study Writer's Experience

- Interviews with people who *know*
- Finding the story in the quagmire of information
- Concept mapping to connect the story
- Balancing viewpoints
- Being comfortable with non-closure
- Structured process, on schedule
- Editing out nice but not necessary
- Opportunity to present at RWMMS*
- Interviewing/inquiry skills
- Appreciation emotional content of work environment
- Deep contextual knowledge about a *real world* event or situation

Behaviors of Good Engineers

(Gentry Lee, JPL)

- Intellectual curiosity
- Sees Big Picture view
- Sees connections
- Comfortable with change
- Comfortable with uncertainty
- Proper paranoia
- Tracks margins and resources
- Communication skills
- Self-confidence and energy
- Appreciation for process
- Personality
- Add to the knowledge of the world



Case Study Writers Workshop

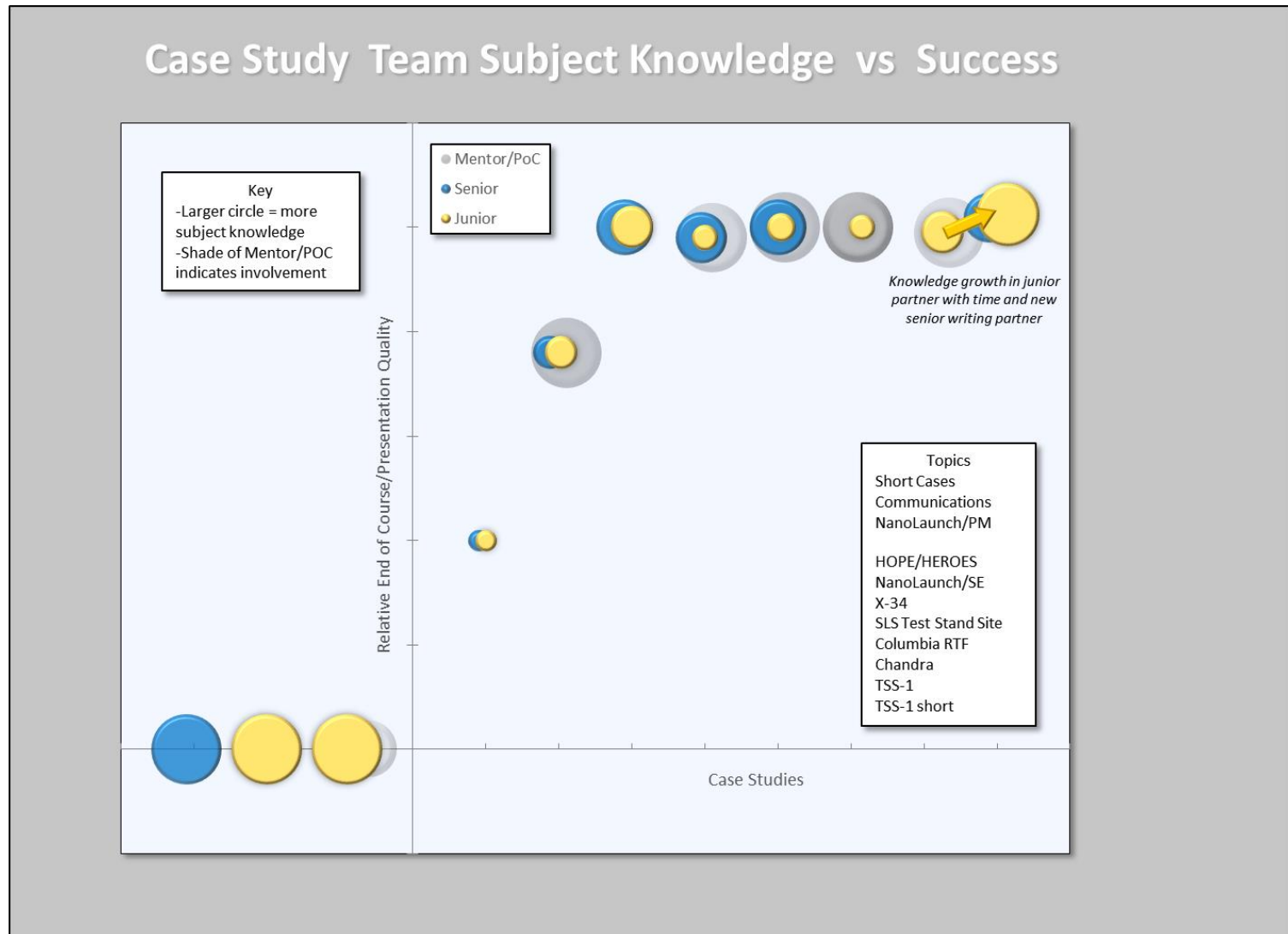
- Impact of subject knowledge to success in producing quality case study
 - Criteria for success: usable in the Real World Marshall Mission Success Course

Subject Area	Mentor (if any)	Senior Partner Subject Knowledge (range)	Junior Partner Subject Knowledge (range)	Relative Success	No. Pages
Government-contractor relationships (PM)		High	Medium	Well polished final draft	7
Launch decision – technical issue (SE)	High		None	Excellent	4
SE implementation small project (SE)	High	Medium	Medium	Well polished final draft	13
Small Project PI-led SE implementation		Low	Low	Good preliminary draft	11
Launch Decision – technical issue	High (detailed out)	Medium	Low	Excellent	16
Launch Decision – technical issue (PM)	High (detailed out)	-	Medium	Excellent	6
- modified/shorter		Medium	Medium	Excellent	3
Center Operations large facility decision	High	High	Low	Excellent	5
Small Project PM/PI conflict	High (detailed out)		High	Did not complete; Time	-
Communication supports mission success			High	Outline; Not paired; Time	
Center future challenges short cases		High		Did not start; Type of CS not desired by author	



Case Study Writers Workshop

- Success and progression of knowledge and writing capability





Future Research

- Future research options
 - Exploring the pedagogical benefits of using case study-based learning in the engineering classroom
 - Studying the impact of systems engineering skills improvement with intentionally-taught case study writing skills included in the curriculum
 - Identifying systems engineering research enhancements through rigorous case study-based qualitative research applied to systems engineering practice
 - Examining impact of case study-based learning and writing skills on increased knowledge of systems approach in traditional engineering curriculum
- Working on
 - Civil servant students partner with industry and government systems engineers to capture *real world* situations